

CLAIMS

What is claimed is:

- 1 1. A photolithographic apparatus for use in a
2 photolithographic system for projecting light onto a
3 workpiece, said photolithographic apparatus comprising a
4 container containing a transparent fluid, said container
5 having a bottom membrane contacting an upper surface of the
6 workpiece and overlapping at least one side edge of the
7 workpiece such that a fluid filled skirt is formed
8 extending beyond the at least one edge of the workpiece.
- 1 2. The photolithographic apparatus of claim 1, wherein the
2 fluid filled skirt is formed at the side edge of the
3 workpiece such that the bottom membrane substantially
4 contacts and conforms to the surface contour of the upper
5 surface and the at least one side edge of the workpiece.
- 1 3. The photolithographic apparatus of claim 1, wherein the
2 bottom membrane comprises a flexible, liquid impermeable
3 membrane.
- 1 4. The photolithographic apparatus of claim 1, wherein the
2 bottom membrane comprises a transparent material.
- 1 5. The photolithographic apparatus of claim 1, wherein the
2 workpiece is a semiconductor wafer.
- 1 6. The photolithographic apparatus of claim 5, wherein the
2 upper surface of the semiconductor wafer is coated with a
3 photoresist material.

1 7. The photolithographic apparatus of claim 1, wherein the
2 bottom membrane provides vertical containment of the
3 optical transmission fluid, said container further
4 including a side wall member coupled to said bottom
5 membrane, said side wall providing horizontal fluid
6 containment.

1 8. The photolithographic apparatus of claim 7, said side
2 wall member coupling the bottom membrane to a top membrane
3 to form a substantially liquid impermeable container
4 enclosure.

1 9. The photolithographic apparatus of claim 8, further
2 comprising a final lens element disposed over and in
3 substantial abutment with the top membrane.

1 10. The photolithographic apparatus of claim 9, wherein
2 said final lens element is a photolithographic lens cover.

1 11. The photolithographic apparatus of claim 7, wherein
2 said side wall member and bottom membrane form an open
3 fluid container externally accessible from above.

1 12. The photolithographic apparatus of claim 11, further
2 comprising a lens apparatus disposed over the open fluid
3 container.

1 13. The photolithographic apparatus of claim 12, wherein
2 said lens apparatus includes a final lens element
3 contacting the fluid within the container.

1 14. A projection exposure apparatus providing
2 photolithographic processing of a semiconductor workpiece,
3 said projection exposure apparatus comprising a fluid
4 container having a bottom membrane and a side wall member
5 defining an open reservoir containing a transparent fluid,
6 wherein said container is disposed over the semiconductor
7 workpiece such that the bottom membrane lays in contact
8 with at least a portion of the upper surface of the
9 semiconductor workpiece.

1 15. The projection apparatus of claim 14, wherein the
2 bottom membrane of said container is transparent.

1 16. The projection apparatus of claim 14, wherein the
2 bottom membrane comprises a flexible material such that the
3 lower outer surface of the open fluid reservoir
4 substantially conforms to the surface contour of the upper
5 surface of the semiconductor workpiece.

1 17. The projection apparatus of claim 14, wherein the
2 bottom member overlaps at least one side edge of the
3 semiconductor workpiece such that a fluid filled skirt is
4 formed extending beyond the at least one edge of the
5 semiconductor workpiece.

1 18. The projection apparatus of claim 14, wherein the
2 semiconductor workpiece comprises a semiconductor wafer.

1 19. A photolithographic system for projecting light onto a
2 workpiece, said photolithographic system comprising:

3 a fluid container having a transparent bottom membrane
4 and a side wall member defining an open reservoir
5 containing a liquid, wherein said container is disposed
6 over the semiconductor workpiece such that the bottom
7 membrane contacts at least a portion of the upper surface
8 of the semiconductor workpiece; and

9 a lens assembly disposed over the open reservoir such
10 that a final lens element is at least partially immersed
11 within the liquid.

1 20. The photolithographic system of claim 19, further
2 comprising liquid circulation means for establishing liquid
3 flow on the bottom surface of the final lens element.